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REPORT

OF THE

FORESTRY COMMISSION

OF

NEW HAMPSHIRE.

LIT... HARVARD UNIVERSITY

JANUARY SESSION, 1891.

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REPORT OF THE FORESTRY COMMISSION.

To the Legislature:

The members of the commission appointed by the Governor and Council in accordance with the provisions of a "joint resolution for the appointment of a commission to ascertain the feasibility of purchasing and preserving the forests of New Hampshire," approved August 16, 1889, having attended to the duties assigned to them, respectfully submit for your consideration the results of their investigations as embodied in the following report.

The joint resolution just referred to may be found on pages 139 and 140 of the Pamphlet Laws of 1889, and reads as follows:

"JOINT RESOLUTION FOR THE APPOINTMENT OF A COMMISSION TO ASCERTAIN THE FEASIBILITY OF PURCHASING AND PRESERVING THE FORESTS OF NEW HAMPSHIRE.

"WHEREAS, the preservation of the forests of New Hampshire is essentially necessary, not only for the prosperity of our vast manufacturing interests, but also to preserve and increase that natural beauty of scenery so attractive to our visitors; and,

"WHEREAS, the hills and mountains in this State are being rapidly denuded of timber and rendered unsightly by the acts of private parties owning the same, therefore

"*Resolved by the Senate and House of Representatives in General Court convened:*

"That the Governor, with the advice of the Council, is hereby authorized and empowered to appoint a commission consisting of three able and discreet men who shall examine and ascertain the feasibility of the purchase by the State of the whole or any portion of the timber lands upon the hills and mountains in the State, near summer resorts, or bordering upon the principal sources of the water-supplies needed for manufacturing purposes, with the view of preserving the same as public lands and parks, and report their finding to the next session of the Legislature.

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"*Resolved*, That the governor is hereby authorized to draw his warrant upon the treasury for the sum of one thousand dollars, or so much thereof as may be necessary to pay for the services and expenses of said commission.

"[Approved August 16, 1889.]"

A commission similar to this was appointed by the Governor and Council in accordance with the provisions of joint resolutions of the Legislature respectively approved July 29, 1881, and September 15, 1883. It was made the duty of that commission "to institute an inquiry into the extent to which the forests of New Hampshire are being destroyed by the indiscriminate cutting of wood and timber for transportation to other states; also, the effect, if any, produced by the destruction of our forests upon our rainfall, and consequently upon our ponds and streams, and into the wisdom or necessity for the adoption of forest laws."

This commission consisted of S. W. Hale, governor, Henry G. Jesup, Joseph B. Walker, William H. Hills, Joseph Barnard, William S. Ladd, Ithiel E. Clay, and William F. Flint. Their report was submitted to the Legislature at its June session in 1885. It covers one hundred printed pages, and discusses at considerable length the five following branches of the subject referred to them for investigation.

1. Forest areas.
2. The forests of New Hampshire in their relation to the amount of rainfall, the water-supply, and the climate of the State.
3. The trees and shrubs composing the New Hampshire forests, their distribution, relative abundance, and utility.
4. Forest management and re-foresting.
5. Forest fires.

As the condition of the forests of the State has not been greatly changed since the date of the former commission's report, and as some of the above topics are still as important in their practical bearing as they were at that time, they

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have received our attention. We hope that all who read our report will again examine that of 1885.

Immediately after its appointment the commission met and organized by electing Joseph B. Walker president, George B. Chandler treasurer, and J. B. Harrison secretary. We have held public meetings and hearings in different parts of the State, have discussed forestry subjects and the value of our scenery in various public addresses, and in numerous articles published in the newspapers of the State and of the country in general. We have also consulted many citizens of New Hampshire who have long been familiar with the forests and waters of our mountain regions, endeavoring thus to avail ourselves as fully as possible of the observation and judgment of any persons who may have given special attention to the subjects which we have had under consideration. We wish to acknowledge here our obligations to all who have in any way aided our inquiries. We have received many letters of interest and value, and have observed with satisfaction frequent indications of increasing popular attention to matters connected with the value of the forests and scenery of the State.

DIRECT OBSERVATION.

We have, however, regarded actual, direct observation as necessary to intelligent and just conclusions, and have been unwilling to make a report upon the forests, streams, and scenery of the State without considerable investigation of their character and capabilities. Since the appointment of the commission we have examined most of our mountain country, especially the White Mountain region and the northern part of the State in general. We saw as much as possible of the condition of the forests and scenery around Fabyan's, Crawford's, the Glen and Profile houses, and about Bethlehem, and went up Mount Washington by the stage road from the Glen House, and came down by

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the railway. We drove through the White Mountain Notch from Crawford's with a team, and went out the whole length of the Zealand Valley Lumber Railroad on a gravel train. We also looked about in the Upper Coös country, going up the Connecticut valley with a horse and wagon, from West Stewartstown to Connecticut lake, seventeen miles, and from there to Mr. Chester's camp at Second lake, nine miles. Crossing this lake in a boat, we followed a blind trail on foot through the forest to Third lake, a walk of six or seven miles, but we thought it nearer ten. We slept in the woods on the shore of the lake, and in the daytime examined the region. We have seen most of the mountain country of our State, going through, across, and around it by nearly every line of travel, — by railways, carriage roads, footpaths, and trails.

From Fabyan's, and about Wing Road, and in many places throughout the White Mountain region, one sees on the mountain sides extensive tracts which have been burned over, where the dead, unsightly tree trunks destroy all the value of the scenery for the present. The sky line, which in all fine landscapes appeals strongly to the imagination by its suggestions of infinite distance beckoning to fairer scenes beyond the utmost range of vision, is here utterly vulgarized and degraded by these straggling ranks of decaying stumps. While these repellent objects mar the scenery it will yield no delight to visitors who seek the solace and peace of nature among the mountains. But in a few years the dead trees will have fallen and disappeared. The slopes once burned over are now, in most cases, already green, as they are growing up with bush cherry and other shrubs which, though worthless for timber, will serve to clothe the hills with foliage until the burning is repeated. But, on the other hand, there are areas of considerable extent in different parts of the White Mountain region where in very dry seasons the deep, rich soil has burned slowly, like a mass of peat, remaining on fire for

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weeks, and burning quite down to the underlying rocks. In some such cases the heat was so great that the heavy, green forest was entirely consumed. One man, whose land had thus been wholly blotted out, timber, soil, and all, said: "You could not pick up a club on a hundred acres big enough to throw at a dog." These areas of scorched and desolate stone will never be covered with forests again. The incidents and accidents of careless human occupancy of the region have here brought back the hard and forbidding conditions under which, measureless ages ago, nature began her work of clothing the bare mountains of rock with the lower forms of vegetable life.

If we look at it from a few miles away, the forest still appears to be unbroken over a large proportion of the White Mountain region, but when we go about on foot we find there has been almost everywhere a great deal of cutting, or, where it has not yet begun, the lumbermen are, in most districts, preparing for extensive operations. This has already caused alarm among the hotel proprietors and their guests, as they note the vigor with which timber-cutting is pushed forward in the vicinity of some of the great mountain houses.

THE WHITE MOUNTAIN NOTCH.

All tourists will remember the long and exquisite drive through the White Mountain Notch from Crawford's, the road shaded and embosomed under a bower of greenery, mile after mile, all the way. To what multitudes of people the enchanting coolness of these woods, and the murmurous music of their crystal waters have given rest and delight! Now the scene is ruined and its beauty blotted out. For a large part of the distance, the woods along the road have been cut off. The trunks of the white birches, which rose through the green leafage like slender shafts of silver, have been cut up into suitable lengths for the market, and the tops of the trees sprawl everywhere

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across the ground in most repulsive confusion and entanglement. In summer the sun-glare is hot on the road, and the air seems entirely changed. We learn from the newspapers that since we were there a fire has burned over the ground along much of the way through this once delightful pass, but even before this the sylvan fragrance and freshness had departed. If anybody is inclined to say that a little matter of scenery in a particular place is not very important — the shade, and the springs, and a few patches of moss along a bit of mountain road — we must remind him that it is for these very things that thousands of people visit the mountain ranges of our State every year, and that if they cannot find these attractions here they will not come. Beauty of scenery has a distinct and increasing economic value, and it has long been an important source of revenue for the people of New Hampshire.

THE FUNCTIONS OF MOUNTAIN FORESTS.

The value and functions of mountain forests are little understood in this country, even by persons of a high degree of general intelligence. The subject, though of great economic importance, has hitherto received but slight attention here, but in Europe it has long been a matter of systematic knowledge and of practical administration.

1. The first and most important function of mountain forests is the preservation of the mountains themselves by clothing them with soil. The relation of mountain forests to the soil out of which they grow is very curious and interesting. The soil produces the trees, but the forest has produced the soil which now nourishes it. There was a time when there was no soil on the mountains of New Hampshire, nor on any portion of the Appalachian system; when the mountains were only ridges, slopes, and summits of bare rock. They were composed wholly of mineral substances, of matter entirely inert and incapable of supplying food to vegetable organisms. There was not

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an atom of soil on the rocks of the whole region, and no vegetable growth of any kind. Then, when conditions permitted, nature began a new order of things here with some of the lowest forms of vegetable life, resembling the lichens of our time. Some of these could grow here and there on the rocks, and whatever could grow would die and decay, but would not wholly perish. Some slight particles of its fibre or substance would remain undestroyed through all the changes of decomposition, and in the course of centuries or thousands of years a thin film of soil was accumulated here and there, sufficient to nourish vegetation of a little higher character and organization than had belonged to the pioneer organisms.

How great the distance from that far beginning to the first trees! And very poor and inferior trees the earliest ones were when they did appear, compared with those which make our forests now, but they were the best that the still scanty soil would sustain. Ever since the leaves of the first trees began to fall the trees have been slowly adding to the deposit of soil which now covers the rocks, and which has reached the depth and productive potency required to sustain the noble forests of our own time.

The great stratum of fertile, life-producing soil which now lies folded around the shoulders of the hills is the result and accumulation of patient ages of dendral toil. Nature has wrought incessantly, through mighty cycles of time, to clothe the desert rocks with life and beauty, and in the untainted air of these lofty slopes and plateaus she now grows forests which are like the columned aisles of vast cathedrals. Ships which cleave the waves of every sea, and the cottages and palaces of mighty cities, with myriads of structures for man's varied industries, have been builded of the materials supplied by our mountain forests. The superior quality of the timber now grown, and the vast quantities in which it is produced, are effects of the wonderful fertility which the soil has attained. It is

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richer than ever before, but it has not reached the limit of possible productiveness. There is no such limit, indeed, and if our mountain forests were rightly managed they would forever increase in fertility, and the quality of their timber would be thereby gradually improved.

A forest is the only crop, so far as we know, which can be produced perpetually on the same ground without diminishing, in any degree, the fertility of the soil. It is a remarkable fact that a forest not only does not impoverish the soil out of which it grows, but that it actually enriches it. As the soil is thus improved it responds by producing superior timber. A mountain forest would yield better timber, and more of it, at the end of a thousand years of proper management than at the beginning, and proper management means and includes the cutting of every tree when it reaches its best estate.

HOW THE SOIL IS HELD IN PLACE.

One interesting feature of the long history of the slow deposit and accretion of the soil of a mountain forest is the fact that it is not only produced or created by the trees, but much of it has been placed where it is now by the agency of the trees, and is held and retained permanently in its position in situations where it would not lie or remain if it were not held there by the trees. The steepest slopes, and the perpendicular and even overhanging sides of rocks are covered with a coating of the richest soil, which is pervaded, matted, and held together by a network of living root fibres, which fills and clasps every part of it. This network or mat of roots is indestructible while the forest stands. The separate, individual roots die and decay, but the living fabric is perpetually and forever renewed, and all the atoms of the soil are clasped and enmeshed in the interlacing, covetous fingers by which the trees grapple and hold their food. The soil of a mountain forest has been produced and put in place *gradually*, and the ex-

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tending root fibres grasp and retain each new accretion as it is deposited, and a large proportion of the soil is now kept in place only by the forest itself.

If forest conditions should be permanently destroyed in any portion of a mountain region, and the mat of roots in the soil "killed out," the soil would not long remain in place on the steep slopes. It would soon begin to break and slip down from the hills at the season of heaviest rainfall, or when the winter's frost has left the ground heaved up and loosened in the spring. This is what has occurred in numberless instances in the mountain regions of our State when the ground has been cleared for cultivation. The most extensive illustrations of this process of entire and fatal denudation which our country has yet produced are to be seen in the Adirondack region of Northern New York, where many thousands of acres of land which would have produced good timber forever are now absolutely worthless, the soil having been washed entirely away, exposing the underlying rocks or the inert gravel and sand which will not sustain vegetable life. Much of the surface of such areas is utterly naked and bare, while other tracts are covered only by a scanty growth of briars, and coarse ferns, and bush cherry. In some instances the action of water upon the undefended earth has been so powerful that enormous gullies have been formed and farms have been almost completely destroyed. This destructive process of the removal of the soil, which results from the destruction of forest conditions on mountain slopes, is already going on in the mountain region of New Hampshire, and on some limited areas the ruin has been completely accomplished. Such tracts are object lessons and examples which show exactly the fate which awaits a large proportion of our mountain country if the present methods of management — or mismanagement — are allowed to continue in operation.

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FARMING IN MOUNTAIN REGIONS.

The entire effort at farming in mountain forest regions in this country is often a most destructive and suicidal mistake. Much of the ground that has been cleared for cultivation in such regions is so steep that if forest conditions are once destroyed upon it the soil is certain to be washed away. It has always been manifest to intelligent observers that such land is suited to the perpetual production of timber, and of that crop alone. In many instances in our State, land has been cleared, and "farmed" with very slight returns, which would be much more valuable than it now is if it were still clothed with forest. The yield of farm products in such cases is scanty and uncertain. In some places the land is too high and cold for successful cultivation. There are frosts late in spring and early in autumn, and sometimes in every month of the brief summer, and the soil is soon exhausted. It would be difficult to find anywhere an instance of more obvious natural adaptation to a particular function than our whole mountain forest region exhibits in its fitness for permanent forest growth, and its unfitness for any permanent beneficial use after forest conditions have been fully destroyed. It would have been much better if some of our "abandoned farms" had never been cleared. In some parts of our country vast values have been permanently blotted out by clearing and cultivating mountain land, and those States will be poorer for all time to come by reason of the resulting destruction and removal of the soil of considerable areas of their mountain regions.

RUIN BY FIRE.

The most fatal agency in destroying the soil of a mountain forest country, and in wrecking the mountains themselves, is that of fire, and in the history of most mountain forest regions the operation of this agency has been closely connected with the attempts to cultivate the soil to which

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we have just referred. In various regions of the Appalachian mountain system many of the farms have been cleared simply by burning the timber and brush left on a tract after it has been lumbered over, and the first crop is planted in the ashes. In a few years the soil is exhausted or washed away, and the farmer goes a little farther up or down the valley, or across the stream which runs through it, and repeats the operation. But the injury to the mountains which is caused by the destruction of the soil of these limited tracts which have been cleared for cultivation is trivial when compared with the losses which have resulted from the forest fires having their origin in these clearings. Until within a few years but little interest has been felt in our country regarding forest fires, and large tracts have been burned over by fires which could easily have been put out at first, or restricted to a limited area, but which no body cared much about, or attempted to control.

But when we consider the rapidly increasing density of the population of our country, and the great advance in the value of all fertile lands, especially in the Eastern States, it is obvious that the complete destruction of the soil of any considerable area is a very serious matter. There are few kinds of losses or misfortunes affecting property which are so calamitous as this. It is a crime against posterity, a permanent subtraction from the wealth and the capabilities of the country. The soil is, to a very great extent, the country itself. A burned city can be rebuilt, and the system of insurance distributes the loss widely. But there is no insurance on the soil of our mountain forests, and when it is once thoroughly burned it will require mighty cycles of time to restore it. Its producing capacity for ages, and all the "promise and potency" of a perpetual succession of valuable crops are at once reduced to nothingness.

A PERMANENT SUPPLY OF TIMBER.

2. The second function of mountain forests is the production of a perpetual supply of timber. As population

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increases, all the land which is naturally adapted to farming, or capable of being profitably cultivated, should be used for the production of other than forest crops. Only the land which will yield greater profit in the production of timber than in any other use should be devoted to that object. This forest land should be as carefully treated as the land which is appropriated to the growing of grain. Forestry is the growing of timber, and the care and management of timber lands *for profit*, and the subject therefore belongs to the department of economics, as does general agriculture, of which forestry is a branch, or department.

On account of the length of time required to mature a crop of trees, this branch of agriculture can usually be made profitable only by maintaining forest conditions permanently on the same land. A mountain forest is commonly composed of trees in various stages of growth. As they come to maturity they should be cut and utilized. That is what timber is for. The method of cutting should be such as will cause least injury to the immature trees which are left standing for additional growth. In most cases a proper system of management will thus provide for frequent harvests of small crops of trees from the same ground, and no great proportion of the forest will be removed at any one time. When this method is pursued the removal of the ripe trees does not injure the growing forest, but is a benefit to the younger trees which remain. It gives them the advantage of increased room and of a larger supply of food elements from the soil. If a tree is not cut soon after it reaches maturity it begins to deteriorate in quality, and its timber becomes less valuable. A tree will live and continue to appropriate food from the soil for years after it has passed its best estate, and it thus makes no return for what it draws from the soil, nor for the space which it occupies to the injury of the younger trees. The removal of too many trees at the same time is

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apt to produce so much change in the conditions of shade and moisture which are necessary for the prosperous growth of the remaining trees that the productive capacity of the forest is seriously impaired.

In the earlier stages of the discussion of forestry subjects in this country it was common to attack and denounce lumbermen as if they were all engaged, out of mere wantonness and malignity, in an effort for the entire extirpation of the forests. But the lumbermen were really not sinners beyond other men. In their wasteful and destructive methods of cutting timber they only illustrated the want of foresight, of self-restraint, and of regard for the interests of posterity which are still, unhappily, far too prominent features of American civilization.

It is one of the most important features of scientific and practical forestry that trees should be cut when they are most valuable. Without such cutting there could be no such thing as forestry. This department of agriculture, like every other industrial pursuit, is engaged in and carried on for profit, and the chief and most directly available pecuniary profits are those which result from the sale and use of timber products.

WASTEFUL METHODS.

Until within a few years timber lands in this country were so cheap that lumbermen had the feeling that the forests were inexhaustible, and that there was no need of effort to avoid waste, or of any thought regarding future supplies of timber. Very often the quantity of timber wasted in lumbering operations has been much greater than the amount which went into actual use, many trees being destroyed to get one into market. In many instances the entire crop of standing timber has been removed at once. This method has been followed especially in making charcoal, as very small trees can be used for this product. But even when all the timber is not removed, that which

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is taken out is often felled with entire disregard of the value of the younger trees, many of which are needlessly crushed and destroyed in cutting down the mature timber. Vast numbers of young trees are also used in the construction of roads and bridges for getting the timber out of the woods, in cases in which the roads could as well be carried around bogs and swamps instead of across them, if the young timber were regarded as having any appreciable value.

ECONOMIC DEVELOPMENT.

The rapid utilization of the forests of the country within the last few years has at length produced the conviction, even in the minds of the most thoughtless and optimistic, that we have no inexhaustible forests, and that it is best to manage timber lands with a view to a succession of crops of timber, and to conduct all lumbering operations by methods favorable to this result. The growth of rational and practical ideas relating to forestry subjects has been partly a matter of economic development; that is to say, the manifest exhaustion of some of our chief sources of supply for timber products has made obvious the necessity of avoiding waste, and of recognizing the changed conditions which are likely to prevail in the future, and which are already being established. As intelligent teaching also produces some effect, we may rightly attribute some measure of the improvement in popular ideas regarding forestry subjects to the discussion of these topics in the press of the country during the last few years.

NATURAL STORAGE OF WATER.

3. The third important function of mountain forests is the formation of natural storage reservoirs for the retention and distribution of water. It is not known that forests exert any appreciable influence on the amount of rainfall, though this has often been the subject of positive and

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fantastic assertions, but all intelligent observers are aware that the water of a heavy shower descends a bare hillside much more rapidly than it does one of equal slope which is covered by a forest. Mountain forests retain the water which falls upon them in rain or snow, and distribute it slowly, the soil being held in place by the pervading mat or network of living roots, which prevents it from slipping down from the rocks when it is heavy with the great quantity of water which it absorbs. This water soaks downward and descends the slopes slowly through the spongy mass of the soil, and the descent of the water which does not penetrate the soil, but runs off over the surface, is obstructed and delayed by the great accumulation of decaying leaves and wood on the forest floor. If the mountain sides were bare of forest, the water of a heavy rain, and that of melting snows in spring, would all descend the slopes so quickly, and so much of it would reach the channels of the streams at the same time, that disastrous freshets would result, after which the streams would soon be nearly dry.

MOUNTAIN SPRINGS.

It is often said that "the water is there in the ground, and it will still come out from the springs and feed the streams, whatever becomes of the forest." But this is an error as to a matter of fact, as has been shown by experiments without number. When the forests on a range of mountains are destroyed the springs soon fail. They are supplied from the great storage reservoir, the soil of the mountain forest, and the soil will not long remain in place, or retain its character as a reservoir for the retention of water, after the forest is removed.

As the soil of a mountain forest region goes on increasing in depth as long as the forests stand, it follows that the capacity of this great natural storage reservoir for the retention of water is gradually enlarged. It holds more

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water, and the streams descending from the region will have a fuller and more equable flow. In some instances where the soil of an extensive mountain forest has come to have a great depth, and where the annual rainfall is very heavy, the water gradually accumulates on the mountains. It comes faster than it can get away, and is thus actually *piled up* in the forest region. In such cases the area of bog, swamp lands and ponds, or of "springy ground" gradually extends itself farther and farther downward and outward into the country surrounding the mountains. This process of the extension of the area of the region of lakes and springs into the drier lands below was going on in many places around the Adirondack region when men first began to cut away the mountain forests there, and the same thing was observed in England when most of that country was still covered with a heavy growth of trees. In all instances of this kind the removal of the forests from the mountains or hill country, the permanent destruction of forest conditions on an area of steeply rolling or sloping land, is followed by the failure of the springs, by aggravated floods, and a sensible diminution of the flow of the streams during summer and autumn.

FORESTS AND STREAMS.

The direct relation between the forests of a mountain country and the permanent flow of the streams which have their sources in them, is one of the most familiar facts of the subject of forestry, as it is also one of the most important in its bearing upon human welfare. The forests have, as we have seen, first made the soil which clothes the rock skeleton of the mountain ranges. This deep, porous mass, or sponge-like blanket of soil, has been gradually woven over the whole surface and framework of our New Hampshire mountain country and it holds vast quantities of water, not only on the small tracts of level land in the valleys but on the steepest slopes and mountain sides. When in such sit-

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uations forest conditions are permanently destroyed, that is, when the living network of root fibres is "killed out," either by the action of fire or by cultivation, the coating of soil soon begins to break at the steepest places, or where much water comes down over the surface, and it will soon fall away and be washed down from the rocks, first where the descent is greatest, and a little later, everywhere. There are already many instances of such effects in various parts of our White Mountain region. The soil, which has been deposited by slow accretion, as the leaves and trees have fallen and decayed through a thousand centuries, is often carried away in a very short time. This destroys the natural reservoir for the storage and retention of water over the whole area thus denuded, and as the existence of the springs, and of the streams which flow from them, depends upon the reservoir, when it is destroyed over an extensive region the regular flow of water therefrom soon fails. The rain and snow fall upon the naked rocks, and the water plunges down the smooth slopes, and swells the streams to floods which carry devastation and ruin along their course through the country below. Great rivers which have hitherto borne a mighty commerce to the sea, sustaining prosperous cities and enriching broad regions of country, are choked with sand and gravel, the debris brought down from the dissolving hills. In times of flood they become a menace to the dwellers in their valleys, and during seasons of protracted drought their flow is so diminished as to make them nearly useless for navigation, and as sources of water-supply for manufacturing purposes. The Hudson river, for instance, has already been seriously injured by the destruction of forest conditions over extensive areas in the region of its sources. The life of this great river is bound up with the life of the mountain forests which through countless ages have sentinelled its springs.

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THE VALUE OF SCENERY.

4. Another important function of mountain forests is the production and maintenance of such conditions of the soil, water, atmosphere, and scenery of the region as are highly favorable to human life, health, and enjoyment. An evergreen mountain forest like that of our White Mountain region is a great natural sanitarium, one of the best and most effective in the world, in its life-giving and health restoring qualities. The destruction of forest conditions over this region would distinctly shorten the lives of great numbers of persons. It would be a serious error to conclude that the sanitary influences of these mountain forests are important only or chiefly to persons already affected by disease. The millions of dwellers in cities all need a season of out-of-door rest and recreation in summer in order to maintain the physical and mental health and soundness which are essential to success in the work of life. Our New Hampshire mountain forest region is a summer playground for the inhabitants of Boston, New York, Philadelphia, and the great cities of the South and West. As their population increases our entire area of forests, lakes, and streams will be needed for this purpose, and it will soon all be brought into use if its attractiveness is not destroyed by despoiling the woods and waters of their freshness and beauty. For the weariness and exhaustion of vitality which so often result from excessive activity in the crowded life of towns and cities there is no healing influence more effective than the silent unconcern of nature amid the scenes and conditions of summer residence in a mountain forest region.

FISH AND GAME PRESERVES.

As a part of this sanitary function of mountain forests, their value as natural preserves for fish and game deserves

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far more serious and intelligent attention than it generally receives. Some occupation is necessary for many persons who go to the woods for summer rest and recreation, and the pursuit of game and fish supplies both physical and mental conditions which are highly favorable and restorative. The slaughter of game of any kind for the mere sake of killing, and of delight in the quantity butchered, is not only unsportsmanlike, it is coarse and disgraceful, and should receive pronounced disapproval everywhere. But fishing and hunting, as pursued by civilized and orderly anglers and hunters, are legitimate and proper means of recreation. If the forests are destroyed there will soon be neither fish nor game. When the shaded brooks are opened to the sun the trout will disappear, and when the wilds are despoiled of their sylvan beauty and sheltered solitudes the hunter's delight in them will be at an end.

The value of mountain forests on account of the beauty and charm of their scenery is closely allied to the sanitary influences already mentioned, and beauty of scenery — in addition to its power to produce happiness, to awaken and nourish "vital feelings of delight," and because of this power — beauty of scenery has in modern times great economic value. Switzerland and Norway and other mountainous countries in Europe derive important revenues from their scenery, which attracts multitudes of visitors from all parts of the civilized world. New Hampshire is remarkable for having so much attractive scenery, so many beautiful landscapes distinct from each other, within a comparatively small area of country. In this respect it is unequaled in any part of the United States. Several millions of dollars are brought to the hands of our people every year by summer tourists and boarders, and yet the attractions of our mountain region are by no means fully developed. But these valuable revenues will be diverted to other parts of our country, and to Europe, unless our mountain forests and streams are protected and preserved.

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An indispensable factor in the development of the value and attractiveness of the scenery of a mountain forest region is the construction and maintenance of good roads by which visitors can travel with safety, speed, and comfort. This important subject may well receive intelligent and systematic attention henceforth, in an increasing degree, in the mountain regions of our State. Mr. Howard Potter, a distinguished citizen of New York, recently wrote to us from London:

"There will be 'millions in it' for the state of New York if that great Adirondack sanitarium can be preserved, and access given to it by such roads as the Norwegians have provided to invite travel in their barren country, travel which is now a perennial source of wealth to Norway, and of pleasure and health to the people who go there on that invitation, and who could not go without it."

We have described the functions of mountain forests because it is convenient to have at hand a brief statement of the facts and reasons which, in the nature of things, must form the basis of all intelligent and successful action for the proper treatment of such forests. The practical bearing of the subject is not always fully perceived at once by those who have never given it special attention.

DESOLATION.

We wish that everybody who visits the region would go up into the woods the full length of the Zealand Valley Railroad, about ten or twelve miles, taking the cars at Zealand Junction, two miles below Fabyan's. The lumbermen to whom that country belongs have built a good standard gauge railroad on which to bring out their timber. They cut only down to ten inches, but the spruces stand so thick that in many places it is difficult to remove the large timber without destroying nearly all. If these proprietors do the best they can to prevent the complete destruction of forest conditions on their mountain lands they

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are pretty nearly helpless against fire. A fire in these woods in a dry time can be controlled only by attacking it very soon after it starts, and there is no fire police, or forest guardianship of any kind, except that of individual citizens. The fire comes sometime, and there is a considerable region along this Zealand Valley Railroad which has been burned until it is completely ruined. All tourists who wait for the cars at Zealand Junction should look across the narrow valley in front of the station, and note the two denuded hills or ledges of rock but a little distance away. It would be good to walk over to them if one has sufficient time, for their white desolation shows what is the destiny of a large proportion of the White Mountain region if nothing is done to interfere with existing conditions and agencies. The ruin is not coming rapidly, but it is coming surely. More and more of the whole region will be cut off, and afterwards burned over, till in time there will be vast tracts of the mountain country of Northern New Hampshire in which there will be no timber, or shade, or verdure, or springs of water.

The condition and treatment of the lakes and streams of our State ought to receive special attention. We do not think the destruction of our mountain forests has yet proceeded far enough to produce a very obvious effect on the volume of water in the Merrimack river, but there can be no doubt that such effect will in time be manifest, and when the injury to the river is clearly apparent it will be too late for any speedy remedial action.

THE UPPER COOS COUNTRY.

The fertile valley land of the upper Connecticut river is now at its best. The hills on each side were, until a few years ago, heavily covered with valuable timber. Now they have all been lumbered over. This would not, of itself, do any harm; timber should always be cut when it reaches its best condition, that is what it is for. But at

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many points in this upper Coös country the steep slopes rising from the valley on each side have been burned over till the root-mat which held the soil in place is breaking up. The young people of our day are likely to live to see this rich upper Connecticut valley almost completely destroyed. The surface materials of the hills will be carried down more and more by the action of the water in the spring season, and will bury the soil of the valley under deposits of inert substances. There are already places on these slopes where trees will never grow again.

Both Connecticut lake and Second lake were formerly surrounded by woods, and the trees grew to the very edge of the water. In order to land, when rowing, a man had to push his boat up among the boughs of the trees and climb out on them, unless there was a landing cleared by the ax. The blue sky never bent over anything in nature more beautiful than these mountain lakes of crystal clearness, with their miles of shore line one continuous fringe and wall of green foliage. But Connecticut lake has been dammed to raise the water to float out logs, the back-water has killed the timber, and now all the lower portions of the shores are ghastly and repulsive tracts where the decaying tree trunks are gradually dropping into the polluted water below. This destruction of the timber by the back-water was entirely unnecessary.

All the country around Connecticut lake and Second lake and between the two, and part of the way from Second to Third lake, has been lumbered over. The timber is not all removed, and from a distance the forest still looks green, but in the woods the tangled mass of fallen trees and treetops is almost impassable.

The wilderness around Third lake has not yet been disturbed. This lovely sheet of water is in the heart of a primeval and not easily penetrable forest, and the traveler is here companioned by the sources of the Connecticut river. The lake extends within a mile or so of the Canada

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line. In the upper Connecticut valley men feel as if the world had just been made and given to them. They say: "Why, there's hardly anything *but* woods. We haven't begun on them yet." It seems to them as if the forests around them were inexhaustible, but the price of timber lands is advancing in every part of our country because business men have become aware that the white pine supply of the upper Mississippi valley is speedily coming to an end, and that everywhere our consumption of timber greatly exceeds the rate of growth. People are unwilling to think of the future, to recognize the conditions which will surround their children. Yet without such foresight the permanence of what we value most in our civilization is impossible.

ACTUAL CONDITIONS.

We have wished to avoid anything extreme in the treatment of this subject, and to write of it in a moderate and practical way. The injury to our forests and scenery has not proceeded so far as in some of the other States of our country, yet it is already serious. The ruin of our forest-clad hills, of our rivers, and of the fertile lands of their valleys, is in progress. It does not yet proceed very rapidly, but it is sure to go on more rapidly hereafter, and if nothing interferes to arrest and prevent it, it is certain to be accomplished in time. More and more of our area of beautiful scenery, which now attracts so many visitors and so much revenue to our State, will become unattractive, and will in consequence be abandoned by tourists and by hotel proprietors. At the same time the number of people to whom summer rest and recreation in a mountain forest region is necessary is rapidly increasing, and if our scenery were properly cared for and preserved it would steadily become more valuable.

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THE FIRST STEP.

What can be done to avert the threatened calamities to which we have referred? It is not easy to see any way to accomplish a great deal in this matter at once. It ought not to be difficult to awaken public interest and enlist public support for a moderate and reasonable plan for the protection of our mountain forests against fire. Such a system has been effectively administered for several years in the State of New York. Its chief features are, the employment of town or local officers as fire wardens, who have authority to call out a sufficient number of men to extinguish forest fires, the officers and all engaged in the work receiving a moderate compensation for the time actually employed, with provisions for the punishment of any person who shall refuse to render such service when called upon, and penalties for setting or neglecting fires which result in damage. As many forest fires are caused by the carelessness of hunters, fishermen, and others who camp in the woods and build fires for cooking, the law of New York requires the forest commissioners to cause rules for the prevention and suppression of forest fires to be printed for posting in schoolhouses and inns, in sawmills and other wood-working establishments, lumber camps, and other places in such portions of the State as they may deem necessary. The efficient operation of laws for the prevention of forest fires depends very greatly upon the temper and sentiment of the people of the region, and the educational influence of such rules and notices has been found valuable in New York, and doubtless might be made so in our State.

Some of our friends say the State ought to condemn and appropriate to public uses the entire "Presidential range," and other extensive tracts in the White Mountain region. But nothing of the kind — of such extent — has ever been done in this country by the exercise of the right of eminent domain, and we have not had in this State even the

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beginning of the educational work which would be required to prepare the public mind for a proceeding of such magnitude. If we could have a few years of such preparatory work we might be able to begin in a small way — and that would be the best way to begin — a course of action which would result in the permanent preservation of the best of our New Hampshire mountain scenery.

It would doubtless be well to place the forests, scenery, and water sources in the State under official supervision, that there may always be some means of directing public attention to these interests. This work of engaging and directing public attention cannot well be done, or will not be done, unless it is made the business and duty of somebody to attend to it.

The State might wisely make small appropriations from time to time for the purchase of such lands in the mountain regions as have been rendered worthless, or nearly so, by reason of the destruction of the soil by fire, and might retain the title to all such lands, situated in the mountain regions, as may come into her possession because of the non-payment of taxes, if there be any such lands. If the injury to the forests and soil of our mountain regions which is now in progress is permitted to proceed indefinitely, there will probably in time be many tracts which will be permitted to revert to the State because their actual value will not sustain any taxation whatever, or yield the smallest profit to their owners. But while state ownership of our mountain forest lands is on some accounts desirable, and may in time become necessary, the expenditure of any large sum in the purchase by the State of extensive tracts of such lands does not appear feasible or advisable at present.

To sum up. — The mountain forests of our State are of great value on account of these most important functions:

1. The preservation of the mountains themselves by clothing them with soil.

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2. The supply of timber.

3. The formation — in the soil — of natural storage reservoirs for the retention and distribution of water. And

4. The production and maintenance of such conditions of the soil, water, atmosphere, and scenery of the region as are highly favorable to human life, health, and enjoyment.

CONFIGURATION OF THE SURFACE OF THE STATE.

Geology largely determines the industrial pursuits of a people. An examination of the different sections of the United States in which different industries prevail incontrovertibly establishes this proposition. Great iron industries have been founded in Pennsylvania, and in other States of similar geological character, because great deposits of coal and iron have attracted them. Cotton culture is found in what is known as the cotton belt because the soil and climate favor its presence there. Similar remarks may be made of the corn and other areas which together constitute our national domain. The New England States are alike, in many respects, geologically, and hence their industries are greatly similar.

Any good topographical map of New Hampshire, such as may be found in the entrance hall of our state house, shows that its surface consists of five great hydrographic basins, drained respectively by the Connecticut, Merrimack, Saco, Piscataqua, and Androscoggin rivers. Extensive watersheds form the sides of these basins, which rise at all angles to heights varying from a few feet to thousands. The river valleys are usually smooth, and the same is true of more or less of the slopes and tablelands above them, but very large areas, embracing the higher hills and mountains, are too steep and rocky for cultivation.

Of the State's total area, not quite a million of acres are at present in tillage, while something like a million and a quarter are in pasture. Water surfaces, highways, and town sites may occupy half a million acres. These make

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an aggregate of about two and three quarters millions of acres, leaving to be accounted for something like three millions of acres, or about fifty-two per cent of our whole surface.

From this statement it will appear that more than one half of our entire State is in forest, and that our forest area is increasing is evident from general observation. By the United States census of 1860 the proportion of unimproved land in farms was 36.8 per cent. In 1880 it had risen to 38 per cent. This proportion is not likely to lessen, and will probably increase. If it be suggested that the progress of a successful agriculture will be likely to redeem more or less land from its present wild condition, and convert it to fruitful fields, we shall be met by the discouraging fact that our mountains and rough hills, full of diluvial boulders and ledges, will not tolerate the presence of the plow. True to the destiny which an omnipotent providence has attached to them, they will produce only wood and timber, and if rightly treated they will produce these abundantly and forever.

It follows, therefore, that the forestry interest in New Hampshire is the most extensive if not the most valuable in the State, and inasmuch as the net profits which it will afford will depend upon the wisdom of its management, it becomes the interest of its owners, and of the public as well, to so regulate its growth that it may return maximum net revenues. What system of management shall be adopted it is not the province of this commission to discuss at much length. Our forests are the property of private owners. The State does not possess a single forest acre. In 1867, for the paltry sum of $25,000, it sold all its wood and timber lands then lying in the three counties of Grafton, Carroll, and Coös, and worth at the time of their sale hundreds of thousands of dollars, and whose value, greatly enhanced by the improved facilities for transportation which are now in use, would by this time have sufficed

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to pay a large portion, if not all, of our state debt. (See copies of three deeds of sale in the office of the secretary state.)

It may be well to refer here to the leading natural resources of the State.

1. We have somewhat more than two millions of acres of soil of but moderate fertility, as are all granite soils, which respond readily to good cultivation, and grow more productive the longer they are tilled.

2. We have also some three millions of acres of forests in all stages of growth, containing forty or more species of valuable wood and timber, which under favorable conditions will yield a perpetual succession of crops. (See report of commission of 1885.)

3. We have an abundance of water power, to be found in greater or less volumes in all parts of the State.

4. We have as pure air and water, and as interesting scenery, as can be found anywhere in our country.

5. To these should be added convenience of access to favorable markets, both home and foreign, and to the immense populations of our Eastern and Middle States.

6. Nor should we omit from a list of our natural resources the granite and ice which are becoming more and more articles of export, the handling and shipping of which give employment to considerable numbers of our people and bring valuable returns to the shippers.

Such are some of our most important natural resources. No one of them has been more than partially developed. Out of the first named above has grown an increasingly prosperous

I. AGRICULTURE.

Its primary products, as enumerated in the United States census of 1880, were :

Cereals.

Corn, 1,350,248 bushels ; worth at 70 cts. per bushel, $945,173.60.

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Rye, 34,638 bushels; worth at 80 cts. per bushel, $27,710.40.

Wheat, 169,316 bushels; worth at $1.00 per bushel, $169,316.

Oats, 1,017,620 bushels; worth at 60 cts. per bushel, $610,572.

Barley, 77,877 bushels; worth at 90 cts. per bushel, $70,089.30.

Buckwheat, 94,090 bushels; worth at 90 cts. per bushel, $84,681.

Grass seed, 619 bushels; worth at $2.25 per bushel, $1,392.75.

Clover seed, 337 bushels; worth at 10 cts. per lb., $2,022.

Total value of cereals, $1,910,957.05.

Pulse and Potatoes.

Beans, 63,576 bushels; at $2.50 per bushel, $158,940.

Peas, 5,044 bushels; at 90 cts. per bushel, $4,539.60.

Potatoes, 3,358,828 bushels; at 60 cts. per bushel, $2,015,296.80.

Total value of pulse and potatoes, $2,178,776.40.

Hay and Other Products.

Hay, 588,170 tons; at $10 per ton, $5, 881,700.

Hops, 23,955 lbs.; at 25 cts. per lb., $5,988.75.

Tobacco, 170,843 lbs.; at 12 cts per lb., $20,501.16.

Honey, 87,886 lbs.; at 20 cts. per lb., $17,577.20.

Wax, 2,856 lbs.; at 20 cts. per lb., $571.20.

Orchard products, $972,291.

Forest products, $2,046,888.

Total value of hay and other products, $8,945,517.31.

Total value of primary products, $13,035,250.76.

The secondary products of the agriculture of the State, as given in the same census are:

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Wool clip of 1880, $1,060,589 lbs., at 25 cts. per lb., $265,147.25.

Milk, sold or sent to butter and cheese factories, 5,739,128 gallons, at 10 cts. per gallon, $573,912.80.

Butter made on farms in 1879, 7,247,272 lbs., at 20 cts. per lb., $1,449,454.40.

Cheese made on farms in 1879, 807,076 lbs., at 11 cts. per lb., $88,778.36.

Eggs, 3,347,211 doz., at 20 cts. per dozen, $669,442.20.

Total value of secondary products, $3,046,735.01.

Value of primary and secondary products, appraised as above, $16,081,985.77.

To the secondary products mentioned above should be added those from cattle, swine, sheep, and poultry, the amounts of which have not been accessible to this commission. Such an addition would doubtless swell the total annual amount of our agricultural products to nearly or quite twenty millions of dollars.

II. THE LUMBERING INDUSTRY.

Out of the second in the list of our natural resources, the forests, an important lumbering interest has been developed, which has largely increased in magnitude during the last ten years. The figures given below are from the census of 1880, and are doubtless considerably below those of the census of 1890, which are not yet published.

The amount of capital invested was $3,745,790.

The value of logs for that year was $2,159,461.

The maximum number of hands employed at any one time during the year ending May 31, 1880, was 4,765.

The amount of wages paid during the year was $548,556.

The products of this year were:

Lumber, board measure, 292,267,000 feet.

Spool and bobbin stock, 3,072,000 feet.

Number of laths, 49,454,000.

Number of shingles, 67,086,000.

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Number of staves, 31,354,000.
Number of sets of headings, 3,491,000.
Value of all other products, $58,612.
Total value of all products, $3,842,012.

From this statement it appears that the total value of our lumber products during the year above mentioned ($3,842,012) was nearly one third as much as that of our primary agricultural products. The rank of New Hampshire among forty-nine other States and Territories as a lumber producing state is among the first third of its associates, it being the fifteenth in importance. (Census of 1880, pp. 486, 487.)

Lumbering was one of the earliest industries established in New Hampshire. It was preceded only by traffic with the Indians and by hunting. (Belknap, Vol. III, p. 203.) The first settlers manufactured timber, boards, pipe staves, and other forest products for exportation to England and the West Indies, and occasionally to the Azores and the Canaries. Quite early they also built ships, which were frequently freighted with lumber and sent to the West Indies, where, having exchanged their cargo for products of those islands, they sailed for Europe, most often for England, where both freight and vessels were sold. At times lumber was receivable for colonial taxes, and its value for that purpose was fixed by statute.

In its grants of territory the crown reserved to itself the fairest and best white pines for masts and spars of the royal navy, as this tree was esteemed more durable than the Norway pine, and those selected were carefully marked with the "broad arrow." There were penalties for the unauthorized cutting of such trees. One of the best political offices in the province — and at times the best — was that of "Surveyor of the King's Woods." It was a royal appointment, and was held for successive periods by some of the most distinguished men in New Hampshire. The

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salary attached was respectable, and the most laborious duties were discharged by deputies.

So engrossing was the attention given to lumbering that for some years previous to the Revolution New Hampshire did not raise corn enough for the use of its inhabitants. During the four years 1765, 1769, 1770, and 1772, three thousand seven hundred and seventy-eight bushels were imported into the Piscataqua to supply the deficiency. The war, however, caused a suspension of lumbering, and notwithstanding the great drafts made for soldiers, agriculture revived, and during the period beginning in 1776 and ending in 1781 more than twenty-five thousand (25,126) bushels were exported from the same locality. Dr. Belknap thinks that this amount, derived from official sources, was but a part of the whole quantity sent from the province during this period.

At the close of the war lumbering operations were resumed, and have been prosecuted ever since. Those engaged in the business in early times did not generally find it a lucrative one, but the constant desire for cleared land for new farms, the fact that it afforded winter occupation when that of farming was interrupted, accompanied as it often was by the fascinations of a free life in the woods, stimulated its prosecution and made it more or less the business of considerable numbers of our people. Of late years the constant demand for its products, fair average prices, increased capital, better means of transportation, and a more systematic management of its interests have resulted in an enlargement of its volume, and its elevation to one of the great industries of the State.

III. MANUFACTURES.

It is apparent that New Hampshire is becoming year by year more and more a manufacturing State, and that in time, as in the New England communities to the south of

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us, this will here be the leading industry. It is to be regretted that the statistics of this interest recently collected are not yet accessible; but those of 1880, supplemented by the universal observation of the expansion of this business, will go far towards establishing the truth of the above proposition.

According to the census of 1880, the number of manufacturing establishments in the State was 3,181.

Capital employed, $51,112,263.

Average number of hands employed, 48,831.

Amount paid in wages during the year, $14,814,793.

Net value of materials, $43,552,462.

Net value of products, $73,978,028.

The motive power for turning the machinery used in this industry was mainly that of water, and many of our most important waterfalls are now devoted to this use. It is, however, a significant and interesting fact that steam has been employed to a considerable extent for this purpose, and its use, rapidly increasing, is rendering that of water less important than it formerly was. The proportional amounts of water and steam power used in manufacturing in this State were in 1870, water power 88.60 per cent, steam power 11.40 per cent. In 1880, water power 78.81 per cent, steam power 21.19 per cent. What are at this time the relative proportions of these two motive powers in our State we cannot determine, but the diminished price of coal, the frequent desire to establish manufacturing industries in villages whose former occupations have left them, where ground is abundant and suitable buildings can be purchased on reasonable terms, but where no water power exists, have led to the extensive use of steam in all parts of the State. This remark will also hold good when applied to manufacturing centers already populous whose water power has long been appropriated by the industries which it originally attracted. When the facts relative to this subject recently collected shall have come to our

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knowledge the proportions of these motive powers will be shown to have approximated still more nearly to an equilibrium. That steam will ever supplant water power now in use is not probable. When dams and distributing canals have been built and paid for, the subsequent cost of water power is very slight, and steam can never displace it. But when dams and canals must be built at large expense, and in inconvenient localities, steam will be often preferred, and will be put in at places regarded as favorable from a business point of view. Cheap coal means cheap steam, and cheap steam or electricity means manufacturing almost anywhere. But we do not anticipate that our water-powers will ever become valueless. The utilization of thousands of them can be secured at so small expense that they will always defy the competition of steam or electricity when the locality of operations is not a matter of grave importance. When the natural resources of the State are fully developed the streams will all be utilized, either for motive power or as a water-supply for agricultural irrigation, and in many places running water will always be cheaper than steam.

IV. ENTERTAINMENT OF SUMMER VISITORS.

From the natural resources of our State in pure air and water and interesting scenery has been developed, mostly within the last thirty years, an industry unlike any previously existing among us. Our seashore, high lands and mountains, our woods and streams, our pure air, crystal water, and fine scenery have been annually attracting within our borders an increasing number of summer visitors. The summer vacation has everywhere become an institution, and nowhere are the requirements of the millions who seek mental diversion and re-invigoration of health more satisfactorily met than in our State. There is but one "Presidential Range" of mountains, and but one grand cluster of "White Hills" in our country, and but one Rye

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and Hampton seashore, with its background of attractive country, its pleasant drives, and teeming fields, and historic associations. All these and many another delightful region are united in New Hampshire's rich heritage. They serve not only the pleasure but the necessities of the great commonwealths around us.

This new industry which has developed so rapidly, especially within the last ten years, will doubtless be a permanent one, and attain still larger proportions if our scenery is rightly cared for. Such is the accessibility of our position that eight millions of people at least, and probably more, can easily transfer themselves from their homes to the heart of our mountains between sunrise and sunset. They can breakfast at their own tables and sup in Franconia, or at the base of Mount Washington, by the light of the same day. We regret that we have at command so few statistics relating to the magnitude or the details of this important business. Of the amount invested in buildings, furnishings, and other appliances for its prosecution we have as yet no knowledge, but that it reaches millions of dollars there can be no doubt. Through the efforts of the efficient secretary of our board of agriculture we are informed of the fact that during the season of 1889 at least 1,113 hotels and boarding-houses, situated in all parts of the State, were open to visitors. He has published the names of the proprietors of these houses with much interesting information, which includes the fact that their aggregate receipts for that year amounted to five millions of dollars.

We shall better realize the magnitude of this great sum if we revert, by way of comparison, to some of our statements relating to the agricultural interests of the State. We have shown that the value of the entire cereal crop of New Hampshire in 1880 was but $1,910,957.05, and that adding the value of the pulse and potato crops the amount was but $4,089,733.45, less by nearly a million of dollars

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than the receipts from the summer boarding business in 1889, which equal more than one third of the value of all the primary farm products of the State ten years ago, although agriculture is, all things considered, our leading industry.

We have said enough to indicate the importance of our new summer industry. It annually brings within our borders great numbers of excellent persons, the value of whose presence is not to be estimated solely by the amount of money they leave behind them. The virtue, intelligence, and social culture which attend them commend them to a hearty welcome, and repeated visits have brought many of them into pleasant acquaintance with the people of our State. Many have gradually prolonged their annual visits, and some have purchased lands, erected houses, and become permanent summer residents. A few have become citizens of the State. Thus far most of the private summer establishments of visitors have been of moderate extent, but some may be reckoned as important landed residential estates. Some such are on the seashore and around Lake Winnipesaukee and Lake Sunapee, in the vicinity of Mount Monadnock, in the heart of the mountains, and in other parts of the State. An attractive example is the residence of the late Mr. B. F. Shaw, on the western slope of Ossipee Mountain, in Moultonborough. Its site is about 700 feet above Lake Winnipesaukee, which lies two or three miles away. The estate consists of about 400 acres of land, largely in forest, and a convenient and attractive mansion, which stands in an ample lawn with woodland on every side. On the east rises the cluster of eminences known as Ossipee Mountain. On the west the broad expanse of the lake, dotted by islands, is in full view, and beyond it Red Hill, Kearsarge, and Monadnock, and many less prominent heights are visible. Estates like this afford evidences of two important facts; first, that the innate love of country life which our English forefathers

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brought to the land of their adoption eight or ten generations ago is still a marked quality in their descendants. As time goes on many of our people will probably have their winter residences in the city and their summer homes in the country. Second, that these influences and conditions will increase our population, especially in summer and autumn, will improve our local markets, give employment to many of our people, and enhance the value of our rural property.

V. THE RAILROAD SYSTEM.

Largely to meet the requirements of the interests we have named, and partially sustained by them, there has grown up a railway system without which the present development of the resources of the State would have been impossible. The last report of our railroad commissioners shows that the parts of this system lying wholly within the State have an aggregate length of more than a thousand miles, and since its issue this has been slightly increased. The aggregate capital stock of the several lines composing the system, within and without the State, was $60,528,670.45. Their total indebtedness was $50,419,523.51, making in amount $110,948,193.96.

The gross income in 1883 was $14,181,292.01. In 1888 this had risen to $24,885,937.99, showing an increase of $10,704,645.98, or more than 75 per cent. In 1888 the railroad companies paid to the State and its towns taxes to the amount of $240,576.96.

Our various railroad lines penetrate all sections of the State, and 141 of our 236 towns are touched by one or more of them. They have already entered several mountain passes, and one has its highest terminus on the summit of Mount Washington. The extension of the system will probably continue until it reaches every considerable town, and penetrates all our important mountain valleys. While it renders of easy access all parts of the State and gives

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important value to products which were formerly without any, in the movements of social and industrial progress it affords to New Hampshire the same facilities for advancement which are enjoyed by her sister commonwealths.

INTERDEPENDENCE OF OUR LEADING INDUSTRIES.

These great leading industries, to which others of a lesser importance might be added, are interdependent upon each other. The prosperity of one promotes that of all the others, and if for any reason one languishes the others are, to a greater or less degree, unfavorably affected. For instance, if the summer boarding interest be injured, the lumbering, manufacturing, agricultural, and railroad industries will feel the injury. Destroy our forests and the great business which has sprung from them will also be destroyed, the water-power of the State will be in large measure annihilated, the manufacturing towns will be seriously embarrassed, and their people will be either remanded to a crippled agriculture for support, or exiled to more fortunate localities. In a word, the close connection between our different industries, and their mutual dependence upon each other, cannot be safely disregarded.

The duty of managing one's own property in such a manner as not to injure his neighbor's is as obligatory in political economy as it is in ethics, and when we come to consider the management of our forests we shall have no better principle to guide us than this. Owners of forest lands will rightly remove their timber as it ripens, and appropriate to their own uses the avails of it. A mature forest tree gains nothing, either in quality or quantity of timber, by being left standing. If an owner fails to remove his ripened trees to his profit, the disintegrating forces of nature will do it to his loss. It is also for the general interest that forest crops should be removed as often as they grow.

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The management of an interest so valuable as our New Hampshire forests is a subject of great public importance, requiring careful consideration. They are all the private property of individual owners, who have the greatest immediate interest in them. That of the public, although great and far-reaching, is less direct.

The proposition frequently made, that the State should acquire large tracts of the mountain forests within its borders by the exercise of its right of eminent domain, suggests obstacles which it might be difficult to overcome. It is not certain that this right extends to the condemnation of tracts so extensive. The statute restricts it to comparatively small areas. The taking from their owners, for public purposes, of sections of land so large as to be measured by townships rather than by acres is without precedent in this State, and, so far as we are aware, in any part of our country. We can hardly believe that the framers of our constitution intended to confer such a power upon the legislature. Nor can we think that, if it possessed it, that body would be inclined to exercise it in the present instance, so great would be the expense to the State which would result. One of the regions whose condemnation would probably be earliest sought would be the "Presidential Range." This, measuring from the proposed extension of the Whitefield & Jefferson Railroad on the north to Mount Isolation on the south, and from Glen Ellis Falls on the west to Mount Clinton on the east, will be found to embrace an area of 66 square miles, or 42,240 acres. At the price of $2 per acre this single tract would cost the State $84,480.

Forest management should be systematic, and such as will yield maximum returns to owners and the greatest incidental good to the other great interests to which allusion has already been made. Two systems have been advocated in this country by writers and speakers on this subject: 1. That of clean cutting and the removal of the whole

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growth; 2. That of cutting only selected trees, or those above a certain size, leaving all others for additional growth.

Those who favor the first plan would remove the entire growth at stated times, leaving the ground bare to re-afforest itself in the intervals between them. When the price of firewood is high, and this, or small timber, only is wanted, as is often the case in the vicinity of small towns, this course may be the best which can be adopted, and the most remunerative at first. But it leaves much *debris* on the ground, which soon dries and becomes inflammable. This, with the leaves covering the soil, is liable to take fire in a dry time and cause the destruction of any new growth which may have started.

This plan also exposes the ground to the sun and winds, which remove from it its surface moisture by evaporation. In the autumn the ground freezes before the snow comes, which thus falls on an impervious surface. When it melts in the spring it flows down impenetrable slopes to the streams, and is carried to the sea in floods and is lost, instead of mostly settling into the ground, as in forest lands, through which it gradually percolates, to feed and make constant the water-courses of the State.

Those who favor the second method advocate the removal from the forest, at such times as seem best, of all timber trees which exceed a given diameter, leaving uncut all of less size. The *debris* of the trees removed remains on the ground, but so few are cut at any one time that no great amount of material is left to sustain fires, and the danger from this source is comparatively inconsiderable. In regions distant from transporting streams, railroads, or public highways, where lumber only will pay for handling, and firewood is of little or no value, this system is undoubtedly the best, and land with fairly good soils and exposures will afford paying crops of timber every twenty or thirty years perpetually. This course has been pursued

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for years in many of our northern forests, and is still largely in vogue. · Of course the mature trees can be cut every year, and this method causes least injury and danger to the forest. In the practice of this system no trees under a minimum size are cut, and usually only trees of selected kinds. Hard wood trees are frequently all left standing, mostly from want of practicable transportation. Whenever this shall be attained more of our hard wood lumber will be taken to market.

A forest thus treated shows little sign of the invasion it may have suffered, and at a distance none whatever. The *debris* of the trees removed decays in a few years. The ground is shaded by the remaining trees, whose tops soon fill the spaces before occupied by those of their former companions. It suffers but little exposure to the sun and winds, its surface freezes but little in winter, its covering of mold is not disturbed, its perviousness is unimpaired, and if fires are started upon it they burn less severely and are more easily extinguished, a matter of very great consequence in sparsely settled localities where help is scarce and hard to be obtained, and the more important when the contraction of our forest reservoirs by close cutting is considered.

Which of these methods of cutting they will adopt must be left to the judgment of individual owners, who will generally be guided by what they deem their highest pecuniary interests. The method of gradual cutting does by far the least injury to the great forest water-holders of the State, and interferes least with equableness of flow of its streams. It also mars the scenery very little as compared with the method of cutting the forest off all at once. It is to be regretted, on every account, that the plan of clean cutting is becoming more and more common in the upper part of the State, where our principal mountain reservoirs are situated, and where the spruce, their best protector from winds and sun and frost, grows in greatest

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abundance. It is the more to be regretted from the fact that when a spruce growth has once been entirely removed it rarely returns. The succeeding growth is apt to be wholly or chiefly of deciduous trees, which will be in leaf to shade the ground for less than half the year.

FOREST FIRES.

Our forests receive their greatest injuries from fires, to whose ravages they are peculiarly exposed during dry periods. They not unfrequently kill the trees and destroy the soil as well. A forest fire has been known to burn for six weeks, unextinguished by rains, and going out only when no combustible matter remained to feed it. There are several reasons why such fires are so destructive, and continue to burn so long.

1. While the conflagration of a barn, worth perhaps an hundred dollars, excites the interest of a neighborhood, whose entire population turns out to see and help extinguish it, a fire in a forest worth tens of thousands of dollars hardly arrests attention, and holds it but for a moment. The proprietors of the burning tract are the only persons greatly anxious for its extinction. In mountain regions it is often difficult to determine at a distance whose woods are on fire. In the former case gratuitous aid is proffered in abundance; in the latter, help can be obtained only by purchase.

2. In sparsely settled regions efforts to extinguish fires in remote situations or on mountains are rarely timely, and when long delayed are found to be useless.

3. In dry periods, the great amount of inflammable *debris* in the woods makes the extinguishment of fires difficult, even when efforts to that end are seasonable and persistent.

In 1880, nearly six thousand (5,954) acres were burned over by twenty-seven different fires, an average of 227 acres by each, at a loss estimated at $63,610. The origin

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of these fires was assigned as follows: to the clearing of land, seven; to locomotives, twelve; to the carelessness of hunters, seven; to smokers, one, and to malice one. (U. S. census of 1880, Vol. IX, p. 499.)

ROADS AND PATHS.

As before remarked, our scenery, our pure air and crystal streams, and our fish and game are as much natural resources of our State as fertile soils and abundant water-powers. The sooner this fact receives general recognition the better for all concerned. They draw to us summer visitors, just as similar attractions in Norway and Switzerland every year draw thousands upon thousands to those countries. As we have said, these natural resources, as yet but partially developed, caused to be left among us by summer tourists in 1889, five millions of dollars. If we had in our mountain regions as good roads and paths as have been constructed in the European countries just named, whereby more of our mountain scenery could be brought to view, and more of our mountain passes, ravines, gorges, and lakes be rendered accessible to the tourist, which are now known only to sportsmen, searchers for timber, and the bold climbers of the Appalachian Club, this large revenue might be doubled and eventually quadrupled, or increased indefinitely. This great interest urgently calls for better roads and paths than it now has, and for more of them. Those required need not all be constructed at once. They can be made gradually, but they should be constructed by plan and system, so that in time every mountain pass shall be accessible by a good highway, and every important lake and summit, and other place of special interest, can at least be reached by an easy footpath or bridle path.

This opinion has a basis other than that of mere sentiment. It rests upon the more solid ground of profitable utility. If properly constructed and cared for such roads

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and paths would prove as remunerative as our average highways. When completed they would afford, in connection with those now in use, circuitous drives of great attractiveness, opening new areas to the lumberman, and new sites for mountain houses, and influencing summer visitors to prolong their sojourn in the State.

As examples of what is easily possible in this direction, we mention three such proposed circuits, to be formed partly of roads already in use and partly of others yet to be constructed. They have been suggested to this Commission by a gentleman whose acquaintance with the White Mountain region is life-long, extensive, and accurate. He has indicated as examples the three following, which may be easily traced on a good map of the mountain region. They are described as follows, viz. :

"1. From Wildwood in Easton through the Moosilauke Notch, to intersect with the new road from North Woodstock to Warren about two miles from North Woodstock, requiring about six miles of new road, with very favorable ground. The building of this link would give a circuit from North Woodstock to the Profile House, ten miles; Profile House to intersection of road from Franconia to Moosilauke mountain, about five miles; to Wildwood, about seven miles; to North Woodstock, eight miles, — about thirty miles in all. It could be made one of the finest drives in the country. About $1,000 per mile would build the six miles of new road required.

"2. From Elliott's Hotel in Waterville to Greeley Ponds in Mad River Notch, four miles; to Hancock Branch, two miles; to mouth of Hancock Branch, six miles; to 'Pollards' in Lincoln, three and one half miles; thence by old road to North Woodstock, two miles; or, fifteen and one half miles of new road will complete the circuit from North Woodstock to Campton Village, twelve miles, to Elliott's, twelve miles, to Pollard's by new road fifteen and one half miles, to North Woodstock two miles, — or forty-one and

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one half miles in all. This link of fifteen and one half miles can be built for $20,000, perhaps for less. From Elliott's to Pollard's is forest all the way.

"3. From Shuckford's in Albany Intervale, which is fourteen miles from Conway Corner and at the end of the road, to falls in Swift river in Livermore, five miles; then intersect the Sawyer's River Railroad to top of divide between Mad river and Swift river waters, about three miles; thence to Elliott's in Waterville, three miles, — or eleven miles in all. This will make a very attractive circuit. Or from Shuckford's to Swift River Falls five miles, thence following up Swift river to its head, and to the divide between Swift and Hancock, about five miles, thence to intersect No. 2, at the Hancock, thence to Elliott's, or to North Woodstock *via* No. 2 route, or about twelve miles from Shuckford's to No. 2. Either of the last named routes would cost about $1,200 per mile, and they are through forest all the way."

When it is considered that these are but three or four of a score or two of routes equally attractive where roads might be constructed it becomes evident that the opening to view of our interesting mountain scenery has thus far made but little progress. If such highways were carefully projected and gradually constructed, at the rate of a few miles each year, their cost would not be burdensome, and they would eventually make known to the world the scenic treasures of our mountain region, many of which are still unknown and inaccessible to tourists.

In these attractions New Hampshire has natural resources possessing a cash value as real as that of her waterfalls or her soil; resources which she can and should develop for the benefit of the thousands of summer visitors who annually come within her borders, and for the pecuniary advantage of her own people. The last Legislature made seventeen different grants of money to aid in the construction and maintenance of public bridges and high-

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ways, mostly in the mountain regions, amounting to $20,700. It is important that there should be system and foresight in the expenditure of such appropriations. The Swiss and Norwegian roads, to which allusion has here been made, have been planned with much care and built with great thoroughness. Their surfaces are hard, their grades are easy, and they are, in all respects, pleasant and safe for travelers. Thus made, they are more expensive at first, but in the end they are more economical, as well as much more satisfactory in use, than the mountain roads to which we are accustomed in New Hampshire.

If in addition to the improvement of the roads in our mountain regions, a good highway, or more than one, were maintained through the entire length of the State, from the seashore, or the Massachusetts state line, to the region of the sources of the Connecticut river, this facility for pleasant horseback and carriage travel would doubtless be regarded as an invitation by many tourists, and would perceptibly increase the summer income of the people living along the improved thoroughfare. Considering the character of most of the roads in the various mountain regions of our country it is extremely probable that an extended system of good carriage roads in this State would soon attract travelers from all parts of the civilized world.

STATE PURCHASE OF MOUNTAIN FORESTS.

New Hampshire stands at a great disadvantage when she seeks to influence in any way the management of her forests, for she is not the owner of a single wooded acre. While we do not recommend the condemnation, for park or other purposes, of any extensive areas of forest land, we are of the opinion that the State's general interests might be promoted if it should acquire, by judicious purchases, carefully selected sections of the mountain region, of small extent, to be held perpetually and so cared for and

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protected that their natural wild attractiveness shall be permanently maintained.

Tracts of denuded land of slight present value are often for sale and can be purchased at reasonable prices. A generation hence, if they are properly cared for, many of these would be covered with wood and timber, and could be used as public forest parks or reservations. The new growth of timber could be retained entire until thinning should become necessary, when the mature trees could be sold under proper regulations.

Advantageous purchases by the State might often be made of land about to be cut over, whereby it should acquire title to the same, subject to the seller's right to remove therefrom, within limited periods, all trees above a certain size. Still other tracts, of little present value, sold for taxes, might be purchased from time to time at prices not exceeding a fair valuation, and left to grow up with timber, as most of them would if properly protected from the ravages of fire. When judiciously selected and bought such lands would not only prove a fairly good investment, all things considered, but their purchase would restore to state control for preservation some portion at least of the great forest reservoir area upon which the equable flow of the streams furnishing the water-power of the State so largely depends.

CONCLUSIONS.

In view of the foregoing facts and considerations this Commission respectfully suggests to your honorable body :

I. That the large expense involved in the condemnation by the State for public purposes, by the exercise of the right of eminent domain, of very extensive areas of its mountain forests, and the undefined limit of the legislative power to authorize the same, render it unwise for the State to proceed far in that direction, and that it confine its ac-

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tion to tracts of small extent, and to those whose condemnation is undoubtedly demanded by the public welfare.

II. That the present statute penalties for the careless or willful firing of woods or forests be increased, and that the selectmen of towns in the mountain regions of the State be constituted fire wardens, whose duty it shall be to watch the woods, and whenever a fire is observed therein to immediately summon such assistance as may seem necessary, go at once to the scene of the fire, and, if possible, extinguish it before it has made such progress as to be resistless. That in regions where no town organizations exist, the county commissioners appoint such wardens. That said wardens be paid for their services the sum of two dollars per day, and those who assist them in the work of extinguishing forest fires, the sum of one dollar and twenty-five cents per day for the time actually employed in such labor, such service to be paid for by the towns in which such forest fires occur, or, in the absence of such town organizations, by the counties.

III. The establishment of a Commission of Forests, to be appointed by the Governor with the advice of the Council, to consist of three men selected for their special fitness for the duties of their office, without regard to political opinions, who shall severally hold their places for terms of three years so arranged that one shall become vacant each year, and that the duties of said commissioners shall be as follows:

1. To thoroughly acquaint themselves with the mountain regions of the State, the quantity of standing timber they contain, the rate at which this has been and is likely to be removed, the condition and management of the forests, and their needs as to roads and paths for the interest and convenience of all who frequent or visit our mountain forest regions.

2. To superintend the construction and repair of all roads, bridle-paths, and footpaths for which appropriations

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may from time to time be made by the Legislature, to appoint overseers of the same, and to fix the compensation of all men and teams the Commission may employ.

3. To make an annual report in writing to the Governor and Council of the wants of the mountain regions of the State as to old and new roads, footpaths, and bridle-paths; the effect of the removal of the forests in past years upon the volume of the streams and the equableness of their flow; with information in regard to forest fires, their number, the extent of their ravages, with the losses resulting therefrom; opportunities for the acquisition of forest lands by the State, or its feasibility; with such other facts and suggestions as they may deem of public importance, the same to be accompanied by such recommendations as may aid the Legislature in its consideration of the various interests connected with the mountain forests in the State.

4. That said Commissioners take measures, through their annual reports, by public addresses, and by communications to the public press, to awaken and increase popular interest in the mountain forest regions of the State.

5. That said Commissioners receive for actual service rendered such a *per-diem* compensation as to the Governor and Council shall appear reasonable, in addition to actual expenses incurred in the discharge of their official duties.

When it is remembered that one half of the whole area of New Hampshire is covered with forests, and that in the future this proportion is quite as likely to be increased as diminished, it becomes apparent that their management is a matter of great importance, and that such methods should be adopted as shall make them productive of regular maximum returns, and promote, as much as possible, the welfare of all the great interests which are connected with them.

There is still an immense quantity of growing wood and timber in the central and upper parts of the State, and at

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frequent intervals throughout this region are abundant water-powers, which nature seems to have placed there to aid in the manufacture of the timber. So far as possible this raw material should be converted into its ultimate forms before it is exported from the State. Millions upon millions of feet of timber now leave our borders in the log, and the value of its stumpage is about all that is realized from it by the people of New Hampshire. The largest profit from it is obtained by manufacturers outside of our State who convert our timber into forms for use, thereby greatly enhancing its original value. If this work were done here the gain from the manufacture would largely increase the profits of our own people.

The importance of the home manufacture of home products may be illustrated by one or two of the many examples which might be cited for this purpose.

1. Some years ago a manufacturer of mackerel kits in one of our central villages used white pine sapling wood in making these articles. It was worth at his mill $4 per cord. When converted into kits the value of a cord of this same wood was $26, an increase of $22, or more than 500 per cent.

2. At the same time the New Hampshire state prison was manufacturing bedsteads from hard wood lumber grown in the State and worth at the prison $20 per thousand feet. Had this been exported from the State in its unwrought condition this price only would have been realized from its sale. When made into bedsteads its value had risen to $75 per thousand, an increase of nearly 300 per cent. The profits of this manufacture amounted to more than $100,000 in the course of a single year.

If, therefore, the people of this State would secure for themselves the highest returns from the products of their forests, they must manufacture those products at home and take for themselves the resulting increment, which is

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almost always several times in amount the value of the raw material.

To glance at the experience of others, — if the people of the cotton belt of our Southern States find it profitable to erect mills in that region for the home manufacture of its great staple, as they have already begun to do, and if the inhabitants of the great Appalachian iron and coal region are wise in constructing furnaces on the site of those products, as they have done for generations, instead of sending their ore elsewhere to be smelted, it seems timely and proper for us to consider whether it is wise for us to send away annually two hundred millions of feet of our great staple, timber, to communities outside of our State to be manufactured there, to their enrichment and to our loss.

The sooner the citizens of New Hampshire recognize the important fact that Providence, declaring itself through the unchanging principles of geology, has designed them to be a manufacturing as well as an agricultural people, the sooner they will reach the path of their ultimate destiny and of their highest prosperity.

JOSEPH B. WALKER,
GEORGE B. CHANDLER,
J. B. HARRISON,
Forestry Commissioners.

CONCORD, N. H., January, 1891.

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